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S/N 10/547535  
Office Action dated 11/07/2006REMARKS

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These remarks are submitted in response to the Examiner's Detailed Action mailed 07 November 2006. Claims 1-16 are pending.

Applicants traverse the rejection of claims 1, 2, 4, 6, 10-12 and 16 as being anticipated by Kittaka '655 because, first, Kittaka '655 does not teach or suggest "a photonic crystal having a refractive index periodicity in at least two directions perpendicular to a propagation direction of electromagnetic wave," as required by claim 1. The optical device of Kittaka '655 has a periodic multilayer structure, but the refractive index periodicity of Kittaka '655 occurs in only one direction perpendicular to a propagation direction of an electromagnetic wave. See, e.g., Figure 2 of Kittaka '655 wherein the direction of propagation is along the z-axis and the periodicity of the refractive index is along only the y-axis.

Second, Kittaka '655 also neither mentions nor suggests any structure of the incident side phase modulation portion, as required by claim 1. In fact, the entire specification of Kittaka '655 is silent about the importance or the benefits of phase modulation in a waveguide. In Kittaka '655, an incident beam enters an end face of a waveguide; but no phase modulation occurs. Kittaka '655 is concerned with manipulating the luminous flux and chromatic dispersion of the beam exiting from the optical device, *see* ¶ [0126], [0130], [0135]. The reference shows light being condensed on the waveguide structure with a lens (Figures 16 and 20), but the lens merely changes the size of the spot that is incident perpendicularly on the waveguide and does not provide phase modulation. Propagation of light in the band on a Brillouin zone boundary in the waveguide element of the present application and in the optical device of Kittaka '655 and bandgap diagrams do not, in and of themselves, create anticipatory structures.

The incident side phase modulation of claim 1 presents at least two advantages that are not taught or even hinted at by Kittaka '665. First, phase modulation limits the propagated electromagnetic wave to mostly or entirely one photonic band, and second, even the lower order band propagation light is on a boundary of a Brillouin zone, *see* page 6, lines 7-30. Further, the present application at page 2, line 22 through page 3, line 10 presents the disadvantages of a one-dimensional photonic crystal such as that

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disclosed by Kittaka '665, in particular, propagation light is generated in a plurality of photonic bands of which the higher-order band light has large wavelength dispersion and group velocity anomalies (which the invention of Kittaka '665 exploits) and the lowest-order band light is mere noise that lowers the utilization efficiency of the incident light energy and decreases the signal-to-noise ratio as stray light. The incident side phase modulation of claim 1 remedies these shortcomings of Kittaka '665, shortcomings not even recognized by the reference, specifically, Kittaka '655 does not discuss phase modulation and specifically excludes any incident or exit phase gratings. Applicants respectfully request the Examiner to withdraw the rejection of claims 1, 2, 4, 6, 10-12, and 16.

Applicants further traverse the rejection of claims 3, 5, 7-9, 13-15, and 17-19 as being obvious in view of Kittaka '655 at least by virtue of their dependence on claim 1. Applicants further contest the assertion that the features of claims 3, 5, 7-9, 13-15, and 17-19 are mere design choices. The features of these claims enhance the confinement of the electromagnetic wave in the core, lessen the chromatic dispersion, and diminish group velocity wave anomalies. Applicants respectfully request the Examiner to withdraw the rejection of the claims.

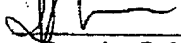
If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, Douglas P. Mueller (Reg. No. 30,300), at (612) 455.3804.

Respectfully submitted,



Dated: February 7, 2007

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